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Attorney Docket No.	:	MPATENT.160A
Applicant(s)	:	Woude
For	:	SYSTEM AND METHOD FOR TESTING A MODEM
Attorney	:	Richard E. Campbell
"Express Mail" Mailing Label No.	:	EL 530999893US
Date of Deposit	:	December 7, 1999

I hereby certify that the accompanying

Transmittal in Duplicate; Specification in 10 pages; 2 sheets of drawings; **SIGNED** Declaration by Inventor in 1 pages; Recordation Form Cover Sheet and Assignment in 2 pages; Power of Attorney by Assignee in 2 pages; Check(s) for Filing Fee(s); Return Prepaid Postcard

are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and are addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231

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ATTENTION: BOX PATENT APPLICATION

Sir:

Transmitted herewith for filing is the patent application of

Inventor(s): **Jeremy Vander Woude**

For: **SYSTEM AND METHOD FOR TESTING A MODEM**

Enclosed are:

(X)   2 sheet(s) of drawing.

(X)   Recordation form cover sheet with 1-page assignment.

(X)   A power of attorney form and copy of assignment.

(X)   Initial signed declaration by inventor(s).

(X)   Return prepaid postcard.

CLAIMS AS FILED

FOR	NUMBER FILED	NUMBER EXTRA	RATE	FEE
Basic Fee			$760	$760
Total Claims	11 - 20 =	0 ×	$18	$0
Independent Claims	4 - 3 =	1 ×	$78	$78
If application contains any multiple dependent claims(s), then add			$260	$0
TOTAL FILING FEE	$838			

(X)   A check in the amount of $838 to cover the filing fee is enclosed.

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(X)   The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Account No. 11-1410. A duplicate copy of this sheet is enclosed.

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Richard E. Campbell
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Attorney of Record

SYSTEM AND METHOD FOR TESTING A MODEM

Background of the Invention

Field of the Invention

5   This invention relates generally to the testing of communication devices and has particular application in the testing of an internal modem on a personal computer.

Description of the Related Art

More and more personal computers, including laptop and desktop models,
10   include modems as standard equipment. With the ever expanding use of the Internet, a modem is becoming a standard accessory for a personal computer. A modem can be used, for example, to transmit and receive information over telephone lines and other communication lines. It would be useful to have a simple portable device which could be used, for example, as part of production quality control testing and/or field testing of
15   modems which are parts of personal computers.

Summary of the Invention

The present invention provides a system and method for testing a modem.

One aspect of the invention is directed to a device for testing the operation of a
20   modem in a computer. The device includes a case with a first communication port attached to the case. A signal reporting circuit is located within the case and coupled to the first communication port. The signal reporting circuit is configured to test the transmit capability of the modem in the computer.

Another aspect of the invention is a method of testing the operation of a modem
25   in a computer using a portable modem testing device. The method includes coupling the modem in the computer to the portable modem testing device and then initiating transmission of test data from the modem with the test data then being received at the portable modem testing device. The transmission is then verified.

In another aspect of the method, the computer is further coupled to the portable
30   modem testing device via an alternate communication link. After the portable modem

testing device has received the transmission from the modem, the portable modem testing device transmits a signal to the computer via the alternate communication link.

Another aspect of the invention is directed to a method of testing the operation of a modem in a computer using a portable modem testing device directed to the receive function of the modem. The modem in the computer is first coupled to the portable modem testing device. Transmission of test data from the portable modem testing device is then initiated. The transmission is received at the modem and the transmission is verified.

In another aspect of the method, the computer is coupled to the portable modem testing device via an alternate communication link. After the modem has received the transmission from the portable modem testing device, a signal is transmitted from the computer to the portable modem testing device via the alternate communication link.

These and other features of the invention will become more fully apparent from the following description and appended claims taken in conjunction with the accompanying drawings.

Brief Description of the Drawings

Figure 1 is a block diagram of a personal computer and a modem tester in accordance with aspects of the present invention;

Figure 2 is a flow chart of an output test; and

Figure 3 is a flowchart of an input test.

Detailed Description of the Preferred Embodiment

Figure 1 is a block diagram depicting a computer 10 and a modem tester 30. The computer can be a personal computer such as a laptop or a desktop computer. The computer 10 includes a central processing unit 32, a memory 34 and an internal modem 12. The modem provides the capability to modulate and demodulate signals. The modem 12 is typically used to communicate over telephone lines. The modem also includes an input/output modem port 14 such as an RJ11 connector or jack. The RJ11 jack can receive a typical RJ11 plug. An alternate communications port 18, such as an RS232 serial port, is also present on the computer 10.

The modem tester 30 includes an outer case 31 and is shown coupled to the computer 10 via the modem port 14 of the computer 10. The communication can be accomplished via a cable 16 such as a typical telephone cable. Additionally, the modem tester 20 is also connected to the computer 10 via the alternate port 18 of the computer 10 using an appropriate cable 24. This arrangement provides two communication links between the computer 10 and the modem tester 30.

The modem tester 30 can include a signal reporting circuit 22 which reports the signals received from the computer 10 via the modem communication line 16 back to the computer 10 via the alternate port 18. An electrical power source 26 is also included in the modem tester 30. The power source can be a battery or power can be provided by an external electrical power supply such as a typical electrical outlet.

The modem tester 30 includes an analog to digital converter 42 which is coupled to a first communication port 43 which can be attached to the case 31 so as to be easily accessible. The first port 43 can be, for example, an RJ11 jack. Alternatively, the modem tester can include a modem having an analog to digital converter. A controller 44, such as a microprocessor 44 and a memory 46, form the reporting circuit 22. The microprocessor 44 and the memory 46 are coupled to the analog to digital converter and to a port 48. Port 48 can be, for example, an RS232 serial port.

When in use, the modem 12 of the computer 10 is coupled to the analog to digital converter 42 via the connector 16 for the transmission of the electrical signals between the modem 30 and the analog to digital converter 12. Additionally, the serial port 18 of the computer 10 is coupled to the serial port 48 of the modem tester 30 via a connector 51.

Signals received over the connection 16 from the modem 12 by the analog to digital converter 42 are converted from an analog to a digital form and then stored in the memory 46. In addition, data stored in the memory 46 can be transmitted by the serial port 48 over the connection 24 to the serial port 18 of the computer 10. Both the port 18 and the port 48 can be serial ports, parallel ports or any other communication ports which will allow the communication of data between the computer 10 and the modem tester 30.

An input device 45, such as a contact switch, is provided on the outside of the modem tester 40 to receive input from a user. The input device 45 can be used, for example, to initiate a transmit test. Similarly, a second input device 47 can be provided on the outside of the modem tester so as to be accessible to a user. The second input device 47 can be used to initiate a second test such as a receive test. Alternatively, other types of input devices known to those of ordinary skill in the art could be used to carry out these functions.

The memory 34 of the computer 10 can be used to store a program which causes the central processing unit 32 to perform the steps of a modem testing routine. Similarly, the memory 46 of the modem tester 30 can also store a software program which can cause the controller 44 to execute a reciprocal portion of a testing routine.

Figure 2 is a flowchart which represents a sequence of operations or steps performed to test the output or transmit capability of a modem in a computer such as personal computer 10 depicted in Figure 1. As will be apparent to those of ordinary skill in the art, the steps of the test can be carried out utilizing software stored in the memories of both the modem tester 30 and the computer 10. Alternatively, control of the sequence of operations or implementation of the steps can be under the control of a program residing entirely and running entirely on either the modem tester 30 or the computer 10.

Referring to Figure 2, at a state 210 the test is initiated. For example, the test can be initiated by an operator using the input device 45. The modem tester 30 then sends a signal via connection 24 or connection 16 to the computer indicating that the test is initiated. Alternatively, the test can be initiated by input provided to the computer. Prior to the test being initiated, connections 16 and 24 between the modem tester 30 and the computer 10 (see Figure 1) should be in place in order to allow communication between the two devices.

At a state 212 the modem 12 of the computer is instructed by the central processing unit 32 to transmit a buffer of test data. Test data can be stored in the memory 34 of the computer 10. Alternatively, the test data can be transmitted to the computer 10 from the modem tester 30 via connection 16 or connection 24.

At a state 214 the modem 12 transmits the test data over connection 16 to the analog to digital converter 42 of the modem tester 30. At a state 216, the analog to digital converter 42 receives the data in the form of an analog signal and converts the analog signal back into digital data. That data is stored in the memory 46. Alternatively, the data from the analog to digital converter 42 can be sent directly to port 48 to be transmitted over connection 24 to the port 18 of the computer 10, thereby reducing the need for memory 46 and microprocessor 44 in the tester 30.

At a state 218 the data stored in memory 46 is transmitted to the computer 10 via port 48 over connection 24 under the control of microprocessor 44. At a state 220 port 18 of the computer receives that data which is then stored in memory 34. At a state 222 the computer 10 compares the data received with the original data that was transmitted in order to confirm that the transmission was successful.

Alternatively, after the modem tester 30 receives the data from the modem 12, the modem tester 30 can compare the receive data against a known data set to determine that the transmission was successful. That arrangement would eliminate the need for the connection 24.

Figure 3 is a flow chart which represents the sequence of steps or operations performed to test the input or receive capability of a modem in a computer such as personal computer 10 depicted in Figure 1. As will be apparent to those of ordinary skill in the art, the steps or process of the test can be carried out utilizing software stored in the memories of both the modem tester 30 and the computer 10. Alternatively, control of the sequence of operation can be under the control of the program residing and running entirely on either the modem tester 30 or the computer 10.

Referring to Figure 3, at a state 310 the test is initiated. For example, the test can be initiated by an operator using the input device 47. The modem tester 30 then sends a signal via a connection 24 or connection 16 to the computer 10 indicating that the test is initiated. Alternatively, the test can be initiated by input provided directly to the computer 10. Prior to the test being initiated, connections 16 and 24 between the modem tester 30 and the computer 10 (see Figure 1) need to be in place in order to allow communications between the two devices.

At a state 312 the modem 12 is initialized to receive data. For example, the CPU 32 can send a command to the modem 12. At a state 314 the computer 10 sends a signal to the modem tester 30 indicating that the modem 12 has been initialized to receive a transmission. For example, the CPU can send a signal via connection 24.

At a state 316 the modem tester 30 transmits test data via connection 16 to the modem 12. At a state 318 the modem 12 receives the test data and stores that data. The data can be stored in an internal buffer of the modem 12 or can be stored in the memory 34 of the computer 10.

At a state 320 the test data received by the modem is verified as accurate. This can be accomplished by the computer 10 having an identical set of the test data. Alternatively, the receive data can be transmitted to the modem tester 30 via connection 24 and a comparison can take place in the modem tester 34. When the test data received by the modem is verified to be accurate, as represented by a state 322, the test has been completed successfully.

The invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as a illustrative and not restrictive. The scope of the invention is indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

WHAT IS CLAIMED IS:

1.   A device for testing the operation of a modem in a computer, the device comprising:

a case;

5   a first communication port attached to the case; and

a signal reporting circuit located within the case and coupled to the first communication port, the signal reporting circuit configured to test the transmit capability of a modem in a computer.

2.   The device of claim 1 further comprising a second communication port

10   coupled to the signal reporting circuit.

3.   The device of claim 1 wherein the signal reporting circuit comprises a microprocessor and an analog to digital converter coupled to the microprocessor and the first communication port.

4.   The device of claim 1 wherein the signal reporting circuit comprises a

15   microprocessor and a modem coupled to the microprocessor and the first communication port.

5.   A method of testing the operation of a modem in a computer using a portable modem testing device, the method comprising:

coupling the modem in the computer to the portable modem testing

20   device;

initiating transmission of test data from the modem;

receiving the transmission from the modem at the portable modem testing device; and

verifying the transmission.

25   6.   The method of claim 5, further comprising:

coupling the computer to the portable modem testing device via an alternate communication link; and

after the portable modem testing device has received the transmission from the modem, transmitting a signal from the portable modem testing device

30   to the computer via the alternate communication link.

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7.   The method of claim 6, further comprising:

sending a signal from the portable modem testing device to the computer via the alternate communication link to initiate testing the operation of the modem in the computer.

8.   A method of testing the operation of a modem in a computer using a portable modem testing device, the method comprising:

coupling the modem in the computer to the portable modem testing device;

initiating transmission of test data from the portable modem testing device;

receiving the transmission from the portable modem testing device at the modem; and

verifying the transmission.

9.   The method of claim 8, further comprising:

coupling the computer to the portable modem testing device via an alternate communication link; and

after the modem has received the transmission from the portable modem testing device, transmitting a signal from the computer to the portable modem testing device via the alternate communication link.

10.   The method of claim 9, further comprising:

sending a signal from the portable modem testing device to the computer via the alternate communication link to initiate testing the operation of the modem in the computer.

11.   A method of testing the operation of a modem in a computer using a portable modem testing device, the method comprising:

coupling the modem in the computer to the portable modem testing device;

initiating transmission of test data from the modem;

receiving the transmission from the modem at the portable modem testing device;

verifying the transmission;

initiating transmission of test data from the portable modem testing device;

receiving the transmission from the portable modem testing device at the modem; and

5   verifying the transmission.

SYSTEM AND METHOD FOR TESTING A MODEM

Abstract of the Disclosure

A system and method for testing a modem in a personal computer are described. A modem tester includes a signal reporting circuit which can report signals received from the modem of the computer. To test the operation of the modem in the computer, test data can be sent from the modem tester to the modem in the computer and test data can be received by the modem tester when transmitted from the modem in the computer.

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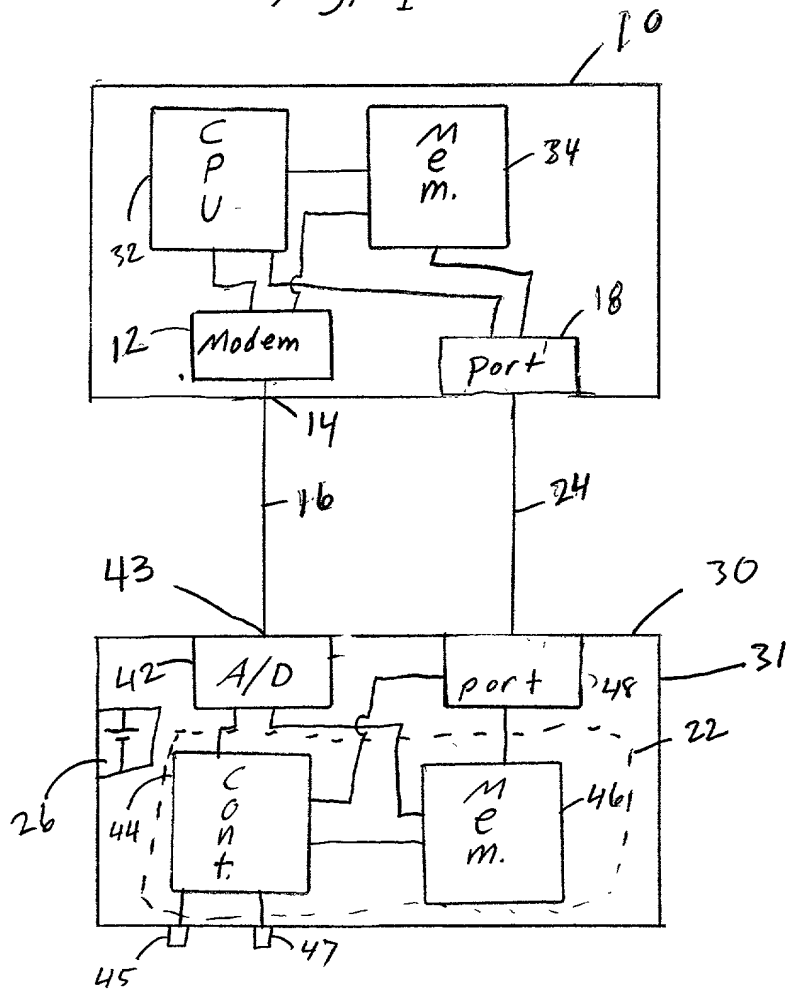S:\DOCS\REC\REC-2640.DOC:sld3:sad4
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Fig. 1

Fig. 2
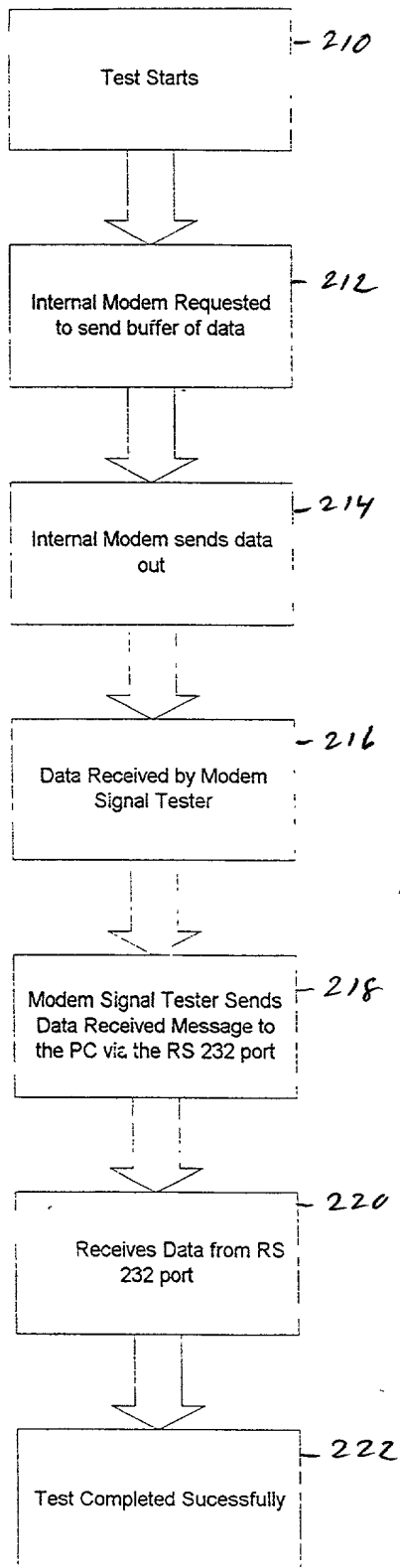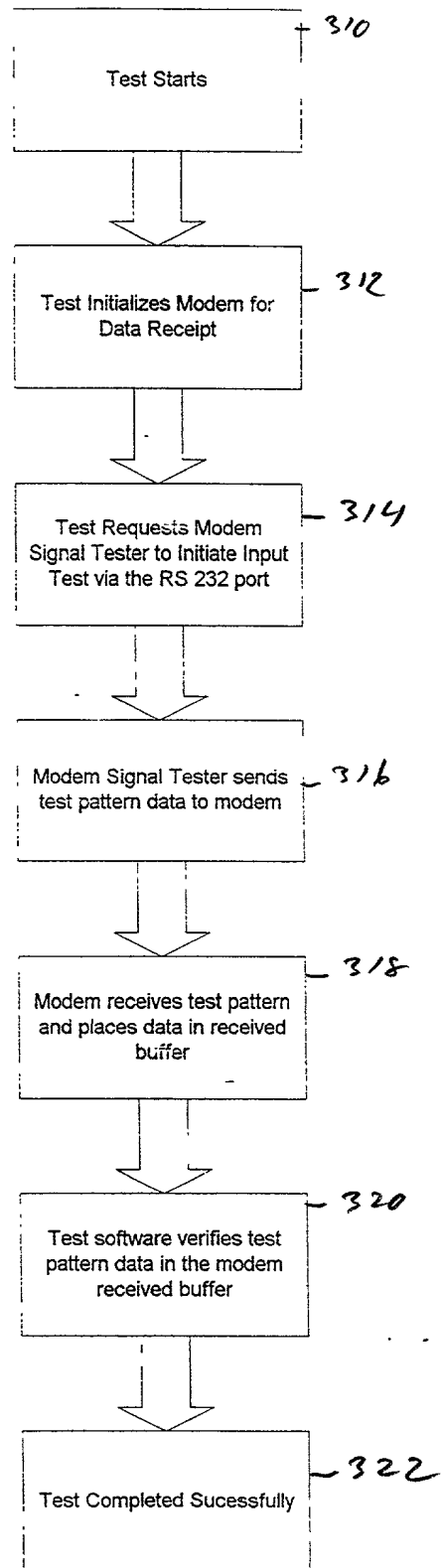
Output Test

Test Starts — 210

↓

Internal Modem Requested to send buffer of data — 212

↓

Internal Modem sends data out — 214

↓

Data Received by Modem Signal Tester — 216

↓

Modem Signal Tester Sends Data Received Message to the PC via the RS 232 port — 218

↓

Receives Data from RS 232 port — 220

↓

Test Completed Sucessfully — 222

Fig. 3

Input Test

Test Starts — 310

↓

Test Initializes Modem for Data Receipt — 312

↓

Test Requests Modem Signal Tester to Initiate Input Test via the RS 232 port — 314

↓

Modem Signal Tester sends test pattern data to modem — 316

↓

Modem receives test pattern and places data in received buffer — 318

↓

Test software verifies test pattern data in the modem received buffer — 320

↓

Test Completed Sucessfully — 322

DECLARATION - USA PATENT APPLICATION

As a below named inventor, I hereby declare that:

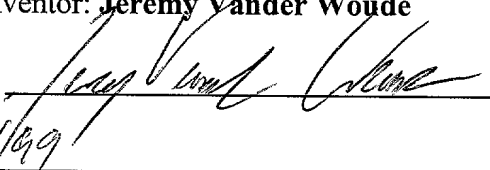My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled SYSTEM AND METHOD FOR TESTING A MODEM; the specification of which is attached hereto;

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56;

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

- -

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Inventor's signature _____

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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App. No.	:	Unknown	)
			)
Filed	:	Herewith	)
			)
For	:	SYSTEM AND METHOD FOR TESTING A MODEM	))
			)
Examiner	:	Unknown	)
			)

ESTABLISHMENT OF RIGHT OF ASSIGNEE TO TAKE ACTION
AND
REVOCATION AND POWER OF ATTORNEY

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

The undersigned is empowered to act on behalf of the assignee below (the "Assignee"). A true copy of the original Assignment of the above-captioned application from the inventor(s) to the Assignee is attached hereto. This Assignment represents the entire chain of title of this invention from the Inventor(s) to the Assignee.

I declare that all statements made herein are true, and that all statements made upon information and belief are believed to be true, and further, that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and that willful, false statements may jeopardize the validity of the application, or any patent issuing thereon.

The undersigned hereby revokes any previous powers of attorney in the subject application, and hereby appoints the registrants of Knobbe, Martens, Olson & Bear, LLP, 620 Newport Center Drive, Sixteenth Floor, Newport Beach, California 92660, Telephone (949) 760-0404, **Customer No. 20,995,** as its attorneys with full power of substitution and
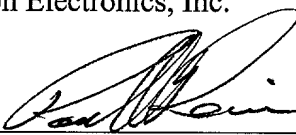
App. No. : Unknown
Filed : Herewith

revocation to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected herewith. This appointment is to be to the exclusion of the inventor(s) and his attorney(s) in accordance with the provisions of 37 C.F.R. § 3.71.

Please use **Customer No. 20,995** for all communications.

Micron Electronics, Inc.

Dated: _11/24/99_ By: _____

Paul A. Revis

Title: Intellectual Property Counsel

Address: 900 East Karcher Road
Nampa, ID 83687

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